


Compression terms: Defining terminology of compression therapy - An international compression club consensus document

Phlebology
2025, Vol. 0(0) 1–6
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/02683555241313422
journals.sagepub.com/home/phl


Giovanni Mosti¹ , Jean P. Benigni², Serge Bohbot³, Nele Devoogdt⁴, Isabel Forner-Cordero⁵ , Eduardo da Matta⁶, Didier Rastel⁷ , Claas Roes⁸  and Sara Thomis⁹

Abstract

Background: The terminology in compression therapy is not always consistent. Confusion arises from layers, components, materials, whether elastic or inelastic, stiff or not stiff, compression class, and other terms. The aim of this paper is to define a standard terminology for compression therapy.

Method: the International Compression Club (ICC) board members prepared a draft consensus paper, which was circulated among the ICC members and refined by GM according to the comments and suggestions received.

Results: All the terms used in compression therapy, from the definition to the materials, compression kits or systems, their physical properties, compression pressure, compression characteristics, and components and layers, were considered and agreed upon.

Conclusions: The given definitions allow for consistent classification of compression materials or devices. The International Compression Club hopes that the proposed terminology will be widely accepted and that papers and congress presentations on compression will use precise terminology.

Keywords

Compression, compression bandaging, compression stockings

Introduction

Compression therapy (CT) is widely used worldwide and is often reported in publications and meeting presentations. Unfortunately, the terminology used in papers and presentations is not always consistent. Therefore, it is recommended that proper terms be uniformly and widely accepted.

This paper aims to report a consensus among International Compression Club (ICC) members on the correct terms regarding CT.

Method

The ICC board members prepared a draft of this consensus paper, which was circulated to all ICC members. They returned comments and suggestions that were integrated into the document by GM. The final document was agreed upon and approved by the ICC board members.

Results

A general agreement was reached on the following terms and definitions.

¹Angiology Department, MD Barbantini Clinic, Lucca, Italy

²University of Paris Sorbonne, Paris, France

³Global Medical Affairs Director, Laoratoire Urgo, Chenôve, France

⁴Department of Rehabilitation Sciences, KU Leuven, Leuven, Belgium

⁵Physical Medicine and Rehabilitation Service, Hospital Universitari I Politecnic La Fe, Universitat de Valencia, Valencia, Spain

⁶Pró-CirculaçãoTM-Angiology and Vascular Surgery Clinic, Xanxerê, Brazil

⁷Selurl Philangio, Grenoble, France

⁸Scientific Support Department, Lohmann & Rauscher GmbH & Co. KG, Rengsdorf, Germany

⁹Centre for Lymphedema, Department of Vascular Surgery, University Hospitals Leuven, Leuven, Belgium

Corresponding author:

Giovanni Mosti, Angiology Department, MD Barbantini Clinic, Via del Calcio 2, Lucca, Italy.

Email: giovanni.mosti10@gmail.com

Compression therapy consists of applying a compression device around a body segment to exert external pressure

It can treat symptoms and signs of chronic venous disease, lymphedema, lipedema and vascular malformations. It can also be used in other indications such as muscle trauma, contusions, sprains, tendon injuries, joint dislocations, Baker cyst rupture.¹

Compression material: Every material that can be used to apply a compression therapy

Physical properties: compression materials can be classified as elastic or inelastic.²

The elastic material is characterized by the ability to regain its initial length after stretch release. Elastic material contains elastic fibers and can be long stretched (elongation >100%). For this reason, it is also called long stretch. It gives way to muscle expansion when standing or walking. Its static stiffness index (SSI) is < 10 mmHg. Elastic bandages and medical compression stockings are typical elastic materials.

The inelastic material has no elastic fiber in the textile. It can be non-stretchable (zinc paste bandage) or slightly stretchable (short-stretch). Depending on its hysteresis curve, the material may or may not return to its initial shape after being deformed. Inelastic material does not give way to muscle expansion (the leg gives way). Its static stiffness index (SSI) > 10 mmHg. Non-stretch or short-stretch bandages, adjustable compression wraps, and pumps are typical inelastic materials.

Types of compression materials: medical compression stockings (also called elastic compression stockings or elastic stockings or just hosiery), hosiery (or elastic) kits, elastic garments, bandages, wraps (also called Velcro® wraps or adjustable compression wraps), and pumps are the materials commonly used to exert compression therapy.

Medical compression stockings: *Compression garments knitted with elastic material*

1. "Standard" or round knit stockings are produced seamlessly and spirally by a circular knitting machine. They can be ready-to-wear to fit multiple leg sizes or made-to-measure in case of dysmorphic legs. They are classified according to the exerted pressure but this classification is different in different countries. For instance, a stocking exerting 20 mmHg is class 1 in German-speaking countries and in Italy but it is class 2 in France and in England. Therefore, we suggest defining elastic stockings only by their exerted pressure and not by classification. These stockings are used mainly in patients with venous disorders.
2. Flat knit stockings: they are knitted in a row with a flat knitting machine and need to be sewn in their

posterior part to be worn. They come in ready-to-wear or can be made-to-measure, specifically prepared for a single patient to fit his/her leg perfectly. These stockings are mainly used in patients with lymphedema and lipedema but also in patients with venous disease with dysmorphic legs.

3. Support stockings or thrombo-embolic deterrent (TED) stockings have no defined pressure distribution; the dose of compression is expressed in deniers or as light, medium, or strong. Finally, the exerted pressure is not guaranteed. These stockings cannot be considered medical products because they do not have the properties of medical aids. They are usually prescribed to people with healthy veins to prevent occupational edema or deep vein thrombosis.

Hosiery kits or elastic kits: *Kits made up with a liner and an overstocking.* They are used on top of each other and provide pressure according to their defined compression class.

Compression bandages: *A strip of stretchable textile that can be wrapped around the leg/arm/midline region.* They can be made of elastic or inelastic material.

Adjustable compression wraps or simply wraps: *Compression sleeves made with inelastic material (non-stretch or short-stretch) applied around a leg or arm and closed by hook-and-loop fasteners.* The term adjustable compression comes from its ability to exert different compression pressures according to the stretch given to the fasteners.

Compression device or compression system: *Has to be used when different materials are applied together.* For example, composite bandages, including padding materials. Wraps are also defined as devices.

Intermittent pneumatic compression (IPC) *is a compression modality exerted by a pump device.* A sleeve with a built-in air bladder covers a body segment. It is provided with a pump that inflates the bladder at a preset time and pressure. The sleeve can cover only the foot, the foot with the calf and the thigh, or the arm and the hand.

Compression or interface pressure: The pressure exerted by a compression material/device

It can be measured in the laboratory and in vivo at the interface between the compression material and a limb experimental model or between the compression material and the skin.³ Pressure values are provided in millimeters of mercury (mmHg).

- i. Resting pressure (also called supine pressure): the interface pressure at rest in the supine position with complete muscular relaxation.
- ii. Working pressure (also called standing pressure): the interface pressure in a standing immobile position.
- iii. Pressure peaks: the pressure peaks during muscle activity.
- iv. Compression pressure measuring device (or instrument): device (or instrument) to measure the compression pressure.

The most widely used are based on pneumatic or piezoelectric technology.

- v. B1: the site for measuring the compression pressure in the lower leg.

A consensus stated that the compression pressure in the leg must be measured, at least, at B1, the medial area where the gastrocnemius tendon turns into the calf muscles (usually about 10–15 cm above the medial malleolus). Even when measured at other leg points, the measurement at B1 cannot be missed to obtain consistent data. There are no recommended measuring locations for the thigh or arm.

Compression characteristics

- i. Elastic power: the force of an elastic material to return to its original length after the stretch is released.

Elasticity was already defined as the property of a material to return to its original length after stretch removal. The force of the elastic material to regain its initial length is the elastic power, which depends on the number of elastic fibers in the thread and the amount of stretch given to the bandage: the more the elastic fibers and the stretch, the stronger the elastic power.

- ii. Stretch/Elongation: the ability of a compression material (specifically bandages) to be extended or stretched to its maximum.

Based on this characteristic, compression materials are distinguished as non-stretchable (elongation < 10%), short stretch (elongation between 10 and 100%), or long stretch (elongation > 100%).

- iii. Hysteresis: the loss in the ability of a compression device to recoil to its original length after exposure to repeated stretch-relaxation maneuvers.
- iv. Stiffness is the pressure increase produced by a compression material or device per 1 cm increase in limb circumference.

The definition comes from the European Committee for Standardization (CEN) for medical compression hosiery.⁴ It can be defined as an elasticity coefficient.

- v. Static Stiffness Index: the difference between the standing and the resting pressure.⁵

When calculating the static stiffness index (SSI), we conventionally assume that the calf circumference increases by 1 cm moving from the supine to the standing position. 10 mmHg is the cutoff between elastic and inelastic material. Actually, the calf circumference never increases by 1 cm when standing up. However, the contraction of the junction between the gastrocnemius tendon and muscle reduces the radius of this area, increasing the pressure according to the Laplace law.⁶ The SSI is a valuable parameter for characterizing the elastic properties of compression materials. The dynamic stiffness index (DSI) and walking pressure amplitudes (WPA) are used for the same aim. However, DSI and WPA are used less and, consequently, are less reported in the literature and less supported by clinical evidence/relevance.

- vi. Dynamic Stiffness Index (DSI): the difference between the maximal and minimal interface pressure during maximal foot dorsiflexions in the supine position or tiptoeing.

The calculation of a dynamic stiffness index previously described⁷ is so complicated that it can be measured only in the laboratory by very complicated instruments. We proposed a simplified calculation of the dynamic stiffness index. 20 mmHg is the cutoff between elastic and inelastic material.

- vii. Walking Pressure Amplitude (WPA): the difference between the maximal and minimal interface pressure during walking or walking on the spot.

Ten mmHg is the cutoff between elastic and inelastic material.

Compression components: compression therapy can be exerted by a single component or multiple components (compression devices or compression kits)

- i. Single component: compression is exerted by only one material.
- ii. Multiple components or multi-component: compression is exerted by more than one component forming a kit.

All the components can be elastic or inelastic. A combination of elastic and inelastic materials is also possible. Multicomponent compression devices are usually called multilayer. This is a mistake. For instance, some compression systems are traditionally called two-layer while they are made up of two components. Similarly, another compression system is traditionally called “four-layer” while it comprises four components and should be, more appropriately, called “multi-component.” They are applied in multiple layers, indeed more than two or four, respectively. Additionally, superimposing different components changes the properties of the final bandage as the friction between several layers comes into play, changing its elastic properties. Consequently, the so-called “four-layer,” comprising four elastic bandages, is characterized by an SSI >10 mmHg in the inelastic range.⁸ Therefore, the terms elastic and inelastic should be restricted to the single compression component. Stiff or non-stiff are the proper definitions for multicomponent bandages. However, in the daily language, inelastic and stiff and elastic and non-stiff are considered synonyms.

Layers: Compression materials/devices can be applied as single or multiple layers

- i. Single layer: just one layer is applied.

A single layer is only possible with elastic stockings.

- ii. Multiple layer or multilayer: compression material or device applied in more than one layer.

All the bandages are multilayer. It is just enough to superimpose the turns of a single bandage by 50% and we will already have two layers. When superimposing a single bandage by 60%–70%, the bandage can result in three layers. The result will be four layers by applying one bandage in figure-of-eight mode. In conclusion, all of them are single component/multilayer, and the term multilayer compression is incorrect and could be avoided when referring to bandages.

Padding materials are not compression materials but are almost always combined with compression materials for different purposes. Some functions of padding material are: contributing to the even distribution of pressure, smoothing the acute angles (e.g., foot dorsum, tibial crest, Achilles tendon) to reduce pressure, and reducing the radius in the concave areas (e.g., trimalleolar space) to increase the local pressure. In patients with leg ulcers, these materials can partially absorb the exudate, even if the proper dressings mainly perform this task. Tubular bandages, cotton, and foam bands are the commonly used materials (Table 1).

Discussion

A common language is always requested in the scientific literature and during scientific presentations so that

misinterpretations cannot occur. Some terms, commonly used incorrectly in published papers and meetings, led the ICC members to refine compression terminology. Just to give some examples:

- In many countries, compression therapy is mistakenly called elastic compression,^{9,10} when the correct term is compression therapy. Elastic compression is just one kind of compression therapy that also includes materials exerting inelastic or stiff compression.
- Elasticity and long stretch are usually confused. However, elasticity refers to a material's ability to regain its initial length when stretch is released, while long stretch refers to its specific elongation property.
- The terms multilayer and multicomponent are often used as synonyms.^{11,12} However, all bandages are multilayer and can be classified as single components or multicomponents. Therefore, we suggest eliminating the term multilayer when speaking about bandages that will be classified only as single components or multicomponents. The terms two-layer, three-layer, and four-layer should be abandoned because these multicomponent bandages are applied in many more than 2,3 or four layers.

If all the terms are accepted, everybody will use the same language and understand what we are speaking about.

Below are some examples of correct definitions of compression devices. However, based on the proposed suggestions, all compression devices can be consistently classified. Regarding bandages, one can wonder what “when correctly applied” means. We believe a bandage is correctly applied when wrapped according to the manufacturer's instructions.

- Medical compression stockings: single-component, elastic stocking exerting a supine pressure between 10 and 50 mmHg.
- Hosiery (or elastic) kit: multicomponent, non-stiff (or elastic) kit, exerting a supine pressure of around 40 mmHg.
- Rosidal[®]K, Putter binde[®], Comprilan[®]: single component, inelastic bandage exerting a supine pressure ≥ 40 mmHg when correctly applied.
- Profore[®]: multicomponent, stiff (or inelastic) compression device (or system) exerting a supine pressure ≥ 40 mmHg when correctly applied. The term multilayer is pleonastic and should be eliminated.
- Urgo K2[®]: multicomponent, stiff (or inelastic) compression device (or system) exerting a supine pressure ≥ 40 mmHg when correctly applied. The term multilayer is pleonastic and should be eliminated.
- Urgo K1[®]: multicomponent in a single bandage, stiff (or inelastic) compression device (or system) exerting a

Table 1. Summary of compression terms.

| Compression therapy | Applying a compression device around a body segment to exert as external pressure |
|---|--|
| Compression material | Every material that can be used to apply a compression therapy |
| Elastic material | Compression material able to regain its initial length after being stretched |
| Inelastic material | Material without elastic fiber in the textile |
| Medical compression stockings or elastic compression stockings or hosiery | Compression garments knitted with elastic material |
| ■ Round knit or standard | Stockings produced seamlessly and spirally by a circular knitted machine |
| ■ Flat knit | Stocking knitted with a flat machine and sewed in their posterior part |
| ■ support stocking or TED | Not a medical product. No defined pressure distribution, no pressure guaranteed |
| Hosiery kit or elastic kits | Kits made up with a liner and an overstocking |
| Compression bandages | Strip of stretchable textile that can be wrapped around the leg/arm/midline region |
| Adjustable compression wraps (ACW) or wraps | Inelastic sleeves applied around leg/arm and closed by hook-and-loop fasteners |
| Compression pump | A sleeve with a built-in air bladder covering a body segment with a pump inflating air in the bladder at a preset time and temperature |
| Padding materials | No compression materials almost always combined with compression materials for different purposes |
| Compression device or compression system | Term used when different materials are applied together |
| Compression pressure or interface pressure | The pressure exerted by a compression material/device on the skin |
| Resting pressure | The interface pressure at rest in the supine position with complete muscular relaxation |
| Working pressure or standing pressure | The interface pressure in a standing immobile position |
| Pressure peaks | The pressure peaks during muscle activity |
| Compression pressure measuring device | Device to measure the compression pressure |
| Point BI | The compression pressure measuring site when measuring the compression pressure in the lower leg. It is located at the junction between the gastrocnemius tendon and muscle 10-15 cm above the inner malleolus |
| Elasticity | The property of the compression material to return to its original shape and size after it has been stretched |
| Elastic power | The force of an elastic material to return to its original length |
| Stretch/Elongation | The ability of a compression material to be extended or stretched to its maximum |
| Hysteresis | The loss in the linear length of a compression device when it recoils after exposure to repeated stretch-relaxation maneuvers |
| Stiffness | The pressure increase produced by a compression material or device per 1 cm increase in limb circumference |
| Static stiffness index (SSI) | The difference between the standing and the resting pressure |
| Dynamic stiffness index (DSI) | The difference between the maximal and minimal interface pressure during maximal foot dorsiflexions in a supine position |
| Walking pressure amplitude (WPA) | The difference between the maximal and minimal interface pressure during walking or walking on the spot |
| Single component | Compression is exerted by only one material |
| Multiple components or multicomponent | Compression is exerted by more than one component forming a kit |
| Single layer | Just one layer is applied. Possible only with medical compression stockings |
| Multiple layer or multilayer | Compression material or device applied in more than one layer. Frequently and mistakenly used instead of multicomponent |
| Intermittent pneumatic compression (IPC) | Compression modality exerted by a pump device |

supine pressure ≥ 40 mmHg when correctly applied. The term multilayer is pleonastic and should be eliminated.

- Rosidal sys[®]: multicomponent, stiff (or inelastic) compression device (or system), exerting a supine pressure ≥ 50 mmHg when correctly applied. The term multilayer is pleonastic and should be eliminated.
- Wraps: single-component, stiff (or inelastic) compression device exerting a wide supine pressure range depending on the stretch of hook-and-loop straps. Some devices are provided with an undersock, tubular bandage, or cover-up, which will be classified as multi-component.
- Intermittent pneumatic compression: stiff (or inelastic) compression device exerting programmable

uniform or sequential compression pressure and compression intervals.

Conclusions

We intend to provide common terminology for all involved in compression therapy to report their experience and data in the English literature.

All publications evaluating these compression systems should systematically report on the above-mentioned terms: the single-component or multi-component system, its supine and standing pressure, its stiffness, and all the other necessary details.

We hope the scientific community will accept this consensus, making compression therapy terminology more precise.

Author contribution

Giovanni Mosti Contributorship: All the authors contributed to preparing the first draft of the document. GM received the inputs from the ICC members and refined the document that all the authors then approved

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Giovanni Mosti  <https://orcid.org/0000-0001-7639-8463>

Isabel Forner-Cordero  <https://orcid.org/0000-0003-2778-037X>

Didier Rastel  <https://orcid.org/0000-0001-9060-3531>

Claas Roes  <https://orcid.org/0000-0001-8398-2254>

References

1. Mosti G, Namislo A, Benigni JP, et al. Indications, contraindications, side effects, general assessment, and outlook for the future: an International Compression Club survey. *Phlebology* 2024; 39: 342–352.
2. Partsch H, Clark M, Mosti G, et al. Classification of compression bandages: practical aspects. *Dermatol Surg* 2008; 34: 600–609.
3. Partsch H, Clark M, Bassez S, et al. Measurement of lower leg compression in vivo: recommendations for the performance of measurements of interface pressure and stiffness: consensus statement. *Dermatol Surg* 2006; 32: 224–232.
4. European Committee for Standardization (CEN). Non-active medical devices. *Working group 2ENV12718: European pre-standard 'medical Compression Hosiery.'* CENTC205. Brussels: CEN, 2001.
5. Partsch H, Schuren J, Mosti G, et al. The Static Stiffness Index: an important parameter to characterize compression therapy in vivo. *J Wound Care* 2016; 25(Suppl 9): S4–S10. DOI: [10.12968/jowc.2016.25.Sup9.S4](https://doi.org/10.12968/jowc.2016.25.Sup9.S4).
6. Basford JR. The law of Laplace and its relevance to contemporary medicine and rehabilitation. *Arch Phys Med Rehabil* 2002; 83: 831–835.
7. Stolk R, Wegen van der-Franken CP and Neumann HA. A method for measuring the dynamic behavior of medical compression hosiery during walking. *Dermatol Surg* 2004; 30: 729–736.
8. Mosti G, Mattaliano V and Partsch H. Influence of different materials in multicomponent bandages on pressure and stiffness of the final bandage. *Dermatol Surg* 2008; 34: 631–639.
9. Maggio G, Armenio A, Ruccia F, et al. A new protocol for the treatment of the chronic venous ulcers of the lower limb. *Clin Exp Med* 2012; 12: 55–60.
10. Van der Stricht J. Surgical management of cellulitis. *Phlebologie* 1981; 34: 575–579.
11. Guest JF, Fuller GW and Vowden P. Clinical outcomes and cost-effectiveness of three different compression systems in newly-diagnosed venous leg ulcers in the UK. *J Wound Care* 2017; 26: 244–254.
12. Lazareth I, Moffatt C, Dissemmond J, et al. Efficacy of two compression systems in the management of VLUs: results of a European RCT. *J Wound Care* 2012; 21: 553–554.